

Remarks

Applicant respectfully requests that the Examiner reconsider the present application in light of the above amendments and following remarks. Claims 12-17 have been added. No claims have been amended or cancelled. Therefore, claims 1-17 are pending in the present application.

The drawing has been objected to because the boxes in Figure 1 need to be labeled descriptively. See *Office Action*, pg. 2. Therefore, the drawing has been amended to label each of the boxes in Figure 1. In particular, the boxes labeled with reference numerals 12, 18, 20, 22 and 24 have been labeled as Stepper Motor, 1st Input Voltage Source, Electronic Controller, Operating Parameters and 2nd or Higher Voltage Source, respectively. The aforementioned drawing amendment is supported in the original disclosure. See *Specification*, pg. 3, lines 9-31. Applicant respectfully requests that the drawing amendment be entered.

Claims 1-11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,731,564 to Diener et al. ("the Diener reference") in view of U.S. Patent No. 6,267,559 to Mossman et al. ("the Mossman reference"), U.S. Patent No. 5,996,553 to Sanvido et al. ("the Sanvido reference"), and U.S. Publication No. 2003/0143445 to Daniel et al. ("the Daniel reference"). Applicant respectfully traverses this rejection.

Claim 1 includes an apparatus including a stepper motor as an actuator of a moveable element against a variable load. The present invention includes a method for increasing the torque output of the stepper motor to overcome a load exceeding the nominal torque output capability of the stepper motor. The method includes the

steps of: a) sensing when a high load condition exists; and b) increasing the voltage provided to the stepper motor to increase the torque output thereof when the high load condition exists.

In rejecting claim 1, the Examiner stated that the Diener reference discloses a method that includes the step of sensing when a high load condition exists as recited in claim 1 of the present invention. See *Office Action*, pg. 3, lines 3-4. Applicant submits that the Diener reference does not teach or suggest this step.

The Diener reference is directed to a machine tool having an electrical torque-type motor (34) that moves a tailstock (20) relative to a headstock (12) to hold a workpiece (16) therebetween. See *Diener*, Col. 2, lines 6-45. The motor is described as being capable of a high torque output to set the workpiece (20) in the device (10). See *Diener*, Col. 2, lines 60-62. The magnitude of the holding force is adjusted by adjusting the voltage applied to the motor (34). See *Diener*, Col. 2, lines 36-37. When the tailstock (20) has applied a predetermined force to the workpiece (16), the electric motor (34) stalls and the tailstock (20) continues to press the workpiece (16) with a force determined by the output torque of the stalled motor (34). See *Diener*, Col. 3, lines 18-23. In order to securely position the workpiece (16) between the head stock (12) and the tailstock (20), a set button (58) on the control panel (42) is depressed to increase the voltage applied to the now stalled motor (34) thereby increasing the output torque of the motor. See *Diener*, Col. 3, lines 26-36.

The Examiner did not specify when the high load condition exists in the Diener reference. Therefore, Applicant will assume that the high load condition

occurs when the motor (34) stalls. See *Diener*, Col. 3, lines 18-23. Nothing in the *Diener* reference provides a method for sensing when the motor (34) stalls. Instead, after the motor (34) stalls, an operator of the machine tool (10) must recognize that the motor is no longer operating and manually press the set button (58) to secure the engagement of the workpiece (16) between the head stock (12) and the tailstock (20).

Further, the Examiner combined apparatus (10) in the *Diener* reference with the stepper motor in the *Mossman* reference to teach the step of increasing voltage provided to the stepper motor as recited in claim 1. Applicant submits that the Examiner has failed to establish a prima facie case of obviousness based on the *Diener* and *Mossman* references.

The Federal Circuit has stated that a prima facie case of obviousness is not met unless "the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." *In re Bell*, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976)). In addition, a rejection based upon 35 U.S.C. § 103(a) must rest on a factual basis. See *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), *cert. denied*, 389 U.S. 1057 (1968). The Examiner has the initial burden of supplying the factual basis for its rejection and may not, because it may doubt that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. See *Warner*, 379 F.2d at 1017, 154 USPQ at 178.

The Examiner has failed to provide a sufficient factual basis for combining the stepper motor from the Mossman reference with the machine tool (10) in the Diener reference. In rejecting claim 1, the Examiner stated that it would have been obvious to one of ordinary skill in the art to combine the apparatus in the Diener reference with the stepper motor in the Mossman reference since any type of motor could be utilized if desired. See *Office Action*, pg. 3, lines 9-11. The mere fact that the machining tool in the Diener reference could be so modified to include a stepper motor does not make the modification obvious unless the prior art suggested the desirability of the modification. See *In re Mills*, 916 F.2d 680, 682, 16 USPQ.2d 1430, 1432 (Fed. Cir. 1990) quoting *In re Gordon* 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). The Examiner has failed to present any factual evidence to support the inclusion of a stepper motor in the Diener reference.

Moreover, the Mossman reference may not be combined with the Diener reference because the references are nonanalogous art. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ.2d 1443 (Fed. Cir. 1992) (stating that it is improper to combine nonanalogous art). As previously stated, the Diener reference is directed to a machine tool (10) having an electrical torque-type motor (34) that moves a tailstock (20) relative to a headstock (12) to hold a workpiece (16) therebetween. See *Diener*, Col. 2, lines 6-45. In contrast, the Mossman reference is directed to an apparatus for reducing power consumption in a linear peristaltic pump. See *Mossman*, Abstract. Since the two fields of art are nonanalogous, there would be no suggestion to combine the art in the Diener and Mossman references.

For at least these reasons, Applicant requests that the rejection of claim 1 be withdrawn. As claims 2-6 depend either directly or indirectly from claim 1, these claims are also not taught or suggested by the references of record for at least the same reasons set forth with respect to claim 1.

Dependent claims 2-6 recite additional features not disclosed in the references of record. For instance, claim 2 states that the apparatus in the present invention is a fuel cell assembly. In rejecting claim 2, the Examiner appears to be combining the teachings in the Diener reference with the fuel cell disclosed in the Daniel reference. See *Office Action*, pg. 3, lines 8-13. However, the Examiner has failed to present any factual evidence to suggest that the teachings in the Diener reference could in fact be used in a fuel cell application. See *Warner*, 379 F.2d at 1017 (stating a sufficient factual basis is required for a obviousness rejection). In addition, the Diener and Daniel references are nonanalogous art. See *Oetiker*, 977 F.2d at 1443 (stating that it is improper to combine nonanalogous art). The Diener reference is directed to a machine tool (10) that is used to secure a workpiece (16), and the Daniel reference is directed to a fuel cell system. See *Daniel*, Abstract. For these additional reasons, Applicant requests that the rejection of claim 2 be withdrawn.

Dependant claim 3 is also not taught or suggested by the references of record. In rejecting claim 3, the Examiner combined the Diener reference with the pintle and air valve disclosed in the Sanvido reference. See *Office Action*, pg. 3, lines 7-13. The Examiner once again failed to provide any factual evidence to show that the prior art suggests combining the pintle and air valve in the Sanvido

reference with the machining tool (10) disclosed in the Diener reference. The Diener reference is directed to a machine tool that is used to secure a workpiece (16), and the Sanvido reference is directed to a idle actuator speed control. See *Sanvido*, Abstract. As such, these particular references are not combinable because the involve nonanalogous art. See *Oetiker*, 977 F.2d at 1443. Applicant requests that the rejection of claim 3 be withdrawn for these additional reasons.

Dependant claim 6 states that a time period of the increased voltage is less than about five seconds. There is nothing in the Office Action that states this portion of the method is taught or suggested in the prior art. Since there has been no basis presented to show this claim is disclosed in the prior art, Applicant requests that the rejection of claim 6 be withdrawn.

Claim 7 is directed to an apparatus including a stepper motor for actuating a moveable element, the stepper motor having a nominal torque output range at a nominal input voltage. An improvement for extending the torque output range of the motor comprises: a) means for determining an actuating load on the motor; b) means for providing a voltage input to the motor greater than the nominal input voltage; and c) control means connected to the determining means and the providing means for responding when the actuating load exceeds a predetermined load value. The control means increases the voltage applied to the motor above the nominal voltage and thereby increases the torque output of the motor to move the moveable element.

None of the references of record teach or suggest an apparatus including means for providing a voltage input to the motor that is greater than the nominal input voltage as recited in claim 1. While the Diener reference states that the set button (58) may be depressed to increase the voltage applied to the stalled motor (34), there is nothing to indicate that the increased voltage is greater than the nominal input voltage. See *Diener*, Col. 3, lines 32-34. In fact, the Diener reference states that the motor (34) is operable to provide a relatively high torque output to seat or set the workpiece (16) in the machine tool (10). See *Diener*, Col. 2, lines 59-61. Therefore, the increased voltage initiated by the set button (58) after the motor (34) has stalled still may be within the nominal input voltage of the motor (34). Therefore, nothing in the Diener suggests that the increased voltage is greater than the nominal input voltage.

In addition, none of the references of record teach or suggest an apparatus including control means connected to the determining means and said providing means for increasing the voltage applied to the motor above the nominal voltage as recited in claim 1. As stated above, nothing in the Diener reference teaches or suggest that the voltage applied to the motor (34) is greater than the nominal input voltage. Thus, the Diener reference also does not teach a control means for increasing the voltage applied to the motor above the nominal voltage.

For at least these reasons, Applicant requests that the rejection of claim 7 be withdrawn. As claims 8-11 depend either directly or indirectly from claim 7, these claims are also not taught or suggested by the references of record for at least the same reasons set forth with respect to claim 7.

Furthermore, dependent claims 8-11 include additional features not taught or suggested by the references of record. For example, claim 8 states that the apparatus is a fuel cell assembly including at least one pintle-type valve and the movable element is a pintle thereof. Also, claim 10 states that the valve is an air valve in the fuel cell assembly and the stepper motor is an actuator for the air valve.

In rejecting claims 8 and 10, the Examiner appears to be combining the teachings in the Diener reference with the fuel cell disclosed in the Daniel reference and the pintle and air valve in the Sanvido reference. See *Office Action*, pg. 3, lines 7-13. However, the Examiner has failed to present any factual evidence to suggest that the teachings in the Diener reference could in fact be used in a fuel cell application or with the pintle or air valve shown in the Sanvido reference. See *Warner*, 379 F.2d at 1017 (stating a sufficient factual basis is required for a obviousness rejection). In addition, the Diener, Daniel and Sanvido references are nonanalogous art. See *Oetiker*, 977 F.2d at 1443 (stating that it is improper to combine nonanalogous art). The Diener reference is directed to a machine tool that is used to secure a workpiece (16), the Daniel reference is directed to a fuel cell system, and the Sanvido reference is directed to a idle actuator speed control. See *Daniel*, Abstract; *Sanvito*, Abstract. The Examiner has not presented any evidence to indicate a suggestion to combine these nonanaolgous fields of art. Applicant requests that the rejection of claims 8 and 10 be withdrawn for these additional reasons.

New claim 12 is directed to an apparatus including a stepper motor for actuating a moveable element, the stepper motor having a nominal torque output

range at a nominal input voltage. An improvement for extending the torque output range of the motor comprising an operating parameter, a higher voltage source and an electronic controller. The operating parameter determines an actuating load on the motor. The higher voltage source provides a voltage input to the motor that is greater than the nominal input voltage. The electronic controller is connected to the operating parameter and the higher voltage source for responding when the actuating load exceeds a predetermined load value. Further, the electronic controller increases the voltage applied to the motor above the nominal voltage and thereby increases the torque output of the motor to move the moveable element.

New claims 13-17 depend from claim 12 and include additional features that are not taught or suggested by the references of record. For example, claim 17 states that the higher voltage source is the fuel cell.

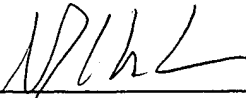
Conclusion

In light of the foregoing, Applicant submits that claims 1-17 are in condition for allowance and such allowance is respectfully requested. Should the Examiner feel that any unresolved issues remain in this case, the undersigned may be contacted at the telephone number listed below to arrange for an issue resolving conference.

The Commissioner is hereby authorized to charge the \$110.00 fee required under 37 C.F.R. § 1.17(a)(1) for the one-month extension of time, and any other fee that may have been overlooked to Deposit Account No. 10-0223.

Respectfully submitted,

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Amendment to the Drawing

The attached drawing sheet labeled "Annotated Sheet Showing Changes" shows the proposed changes to Figure 1. The attached drawing labeled "Replacement Sheet" includes the changes to Figure 1 and represents a formalized version of Figure 1.

Attachments: Annotated Sheet Showing Changes
Replacement Sheet



Charles R. DeJohn
METHOD AND APPARATUS FOR
EXTENDING THE TORQUE RANGE OF A
STEPPER MOTOR
Docket No.: 89190.038903/DP309621
Sheet 1 of 1

Annotated Sheet Showing Changes

